

Claims

[c1] What is claimed is:

1.A display panel comprising:

a silicon substrate having a plurality of pixels arranged in a pixel array thereon, each of the pixels comprising a plurality of subpixels;

a transparent substrate positioned above the silicon substrate, the transparent substrate having a top surface and a bottom surface;

a liquid crystal layer positioned between the transparent substrate and the silicon substrate; and

a plurality of micro color filters positioned on the top surface of the transparent substrate, each of the micro color filters being positioned corresponding one of the subpixels.

[c2] 2.The display panel of claim 1 further comprising a transparent conductive layer positioned on the bottom surface of the transparent substrate.

[c3] 3.The display panel of claim 2, wherein the transparent conductive layer is an indium tin oxide (ITO) layer.

[c4] 4.The display panel of claim 1 further comprising a top

alignment layer positioned between the transparent substrate and the liquid crystal layer.

[c5] 5.The display panel of claim 1 further comprising a bottom alignment layer positioned between the silicon substrate and the liquid crystal layer.

[c6] 6.The display panel of claim 1, wherein the transparent substrate is a glass substrate.

[c7] 7.The display panel of claim 1, wherein the micro color filters comprise a plurality of red micro color filters, a plurality of blue micro color filters, and a plurality of green micro color filters, each of the red micro color filters, the blue micro color filters, and the green micro color filters being positioned corresponding one of the subpixels of each of the pixels.

[c8] 8.The display panel of claim 7, wherein the micro color filters comprise photosensitive materials.

[c9] 9.The display panel of claim 8, wherein the red micro color filters, the blue micro color filters, and the green micro color filters further comprise red, blue, and green dyes.

[c10] 10.The display panel of claim 8, wherein the photosensitive materials are photoresist materials or photoresist

resins.

- [c11] 11.The display panel of claim 7, wherein each of the micro color filters comprises a plurality of optical thin films.
- [c12] 12.The display panel of claim 11, wherein the optical thin films are dichroic films.
- [c13] 13.The display panel of claim 11, wherein each of the micro color filters is an optical thin-film stack.
- [c14] 14.The display panel of claim 13, wherein the optical thin-film stacks are low index optical thin-film stacks comprising silicon oxide (SiO_2) thin films.
- [c15] 15.The display panel of claim 13, wherein the optical thin-film stacks are high index optical thin-film stacks comprising titanium oxide (TiO_2) thin films or tantalum oxide (Ta_2O_5) thin films.
- [c16] 16.The display panel of claim 11, wherein when light enters the display panel, lights of a first specific spectrum, a second specific spectrum, and a third specific spectrum are capable of passing through the corresponding micro color filters.
- [c17] 17.The display panel of claim 16, wherein lights of the first specific spectrum, the second specific spectrum,

and the third specific spectrum are red, blue, and green lights respectively.

- [c18] 18.A display panel comprising:
 - a silicon substrate having a pixel region thereon;
 - a transparent substrate positioned above the silicon substrate, the transparent substrate having a top surface and a bottom surface;
 - a liquid crystal layer positioned between the silicon substrate and the transparent substrate; and
 - at least a color filter positioned on the top surface of the transparent substrate and corresponding to the pixel region.
- [c19] 19.The display panel of claim 18 further comprising a transparent conductive layer positioned on the bottom surface of the transparent substrate.
- [c20] 20.The display panel of claim 18, wherein the transparent conductive layer is an indium tin oxide layer.
- [c21] 21.The display panel of claim 18 further comprising a top alignment layer positioned between the transparent conductive layer and the liquid crystal layer.
- [c22] 22.The display panel of claim 18 further comprising a bottom alignment layer positioned between the silicon substrate and the liquid crystal layer.

- [c23] 23.The display panel of claim 18, wherein the transparent substrate is a glass substrate.
- [c24] 24.The display panel of claim 18, wherein the color filter comprises a photosensitive material.
- [c25] 25.The display panel of claim 24, wherein the photosensitive material comprises at least a color dye.
- [c26] 26.The display panel of claim 24, wherein the photosensitive material is a photoresist material or a photosensitive resin.
- [c27] 27.The display panel of claim 18, wherein the color filter is an optical thin-film stack comprising a plurality of optical thin films.
- [c28] 28.The display panel of claim 27, wherein the optical thin films are dichroic films.
- [c29] 29.The display panel of claim 27, wherein the optical thin-film stack is a low index optical thin-film stack comprising a silicon oxide (SiO_2) thin film.
- [c30] 30.The display panel of claim 27, wherein the optical thin-film stack is a high index optical thin-film stack comprising a titanium oxide thin film or a tantalum oxide thin film.

